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NUTRITIONAL ASSESSMENT OF THE FT. RILEY NON-COMMISSIONED OFFICER ACADEMY DINING FACILITY

U S ARMY RESEARCH INSTITUTE
OF
ENVIRONMENTAL MEDICINE
Natick, Massachusetts

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UNITED STATES ARMY
MEDICAL RESEARCH & DEVELOPMENT COMMAND

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In response to a tasking from the Office of the Deputy of Staff for Logistics, the U.S. Army Research Institute of Environmental Medicine (USARIEM) conducted the first of a series of nutritional assessments to evaluate the impact of nutrition initiatives to moderate the calorie, fat, sodium, and cholesterol intakes of soldiers subsisting in Garrison Dining Facilities. During July-August 1986, USARIEM conducted a 7-day evaluation of total daily food item consumption and nutrient intakes of 43 male Primary Leadership Development Course (PLDC) students consuming 3 meals per day in the contractor-operated NCO Academy Dining Facility at Ft. Riley, Kansas. Nutrient intakes were evaluated by comparing average daily consumption (group means) with the Office of the Surgeon General (OTSG) recommendations.

Nutrient intakes met the Military Recommended Dietary Allowances (MRDAs) for energy, protein, vitamins, and minerals. Initiatives to lower fat intakes, e.g., low fat milk etc. appeared to be working. Total fat intakes comprised 37.5% of total calories,

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a value below previous findings (42%) but still exceeding the target level of 35% (maximum) of total calories. Average daily cholesterol intakes of 760 mg per day were 2-1/2 times levels (less than 300 mg/day) recommended by the American Heart Association and others. The OTSG has made no specific recommendations for the cholesterol intake of healthy soldiers. Eggs provided 42% of total daily cholesterol consumed. Total sodium intakes of 1821 mg sodium per 1000 kcalories exceeded the target range of 1400-1700 mg sodium/1000 kcalories with about 10% of the sodium being derived from added (discretionary) salt.

→ Current nutrition initiatives should be continued and expanded to further decrease fat consumption. The feasibility and effectiveness of using cholesterol-free egg substitutes as a means to moderate cholesterol intakes should be tested and evaluated in Military Dining Facilities prior to full scale implementation.

NUTRITIONAL ASSESSMENT OF THE FT. RILEY NON-COMMISSIONED OFFICER ACADEMY DINING FACILITY

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ABSTRACT

In response to a tasking from the Office of the Deputy Chief of Staff for Logistics, the U.S. Army Research Institute of Environmental Medicine (USARIEM) conducted the first of a series of nutritional assessments to evaluate the impact of nutrition initiatives to moderate the calorie, fat, sodium and cholesterol intakes of soldiers subsisting in Garrison Dining Facilities. During July-August 1986, USARIEM conducted a 7-day evaluation of total daily food item consumption and nutrient intakes of 43 male Primary Leadership Development Course (PLDC) students consuming 3 meals per day in the contractor-operated NCO Academy Dining Facility at Ft. Riley, Kansas. Nutrient intakes were evaluated by comparing average daily consumptions (group means) with the Office of the Surgeon General (OTSG) recommendations.

Nutrient intakes met the Military Recommended Dietary Allowances (MRDA's) for energy, protein, vitamins, and minerals. Initiatives to lower fat intakes, e.g., low fat milk etc., appeared to be working. Total fat intakes comprised 37.5% of total calories, a value below previous findings (42%) but still exceeding the target level of 35% (maximum) of total calories. Average daily cholesterol intakes of 761 mg per day were 2-1/2 times levels (<300 mg/day) recommended by the American Heart Association and others. The OTSG has made no specific recommendations for the cholesterol intake of healthy soldiers. Eggs provided 42% of total daily cholesterol consumed. Total sodium intakes of 1821 mg sodium per 1000 kcalories exeeded the target range of 1400-1700 mg sodium per 1000 kcalories with about 10% of the sodium being derived from added (discretionary) salt.

Current nutrition initiatives should be continued and expanded to further decrease fat consumption. The feasibility and effectiveness of using cholesterol-free egg substitutes as a means to moderate cholesterol intakes

should be evaluated. Revised Armed Forces Recipe Service recipes with reduced salt content should be tested and evaluated in Military Dining Facilities prior to full scale implementation.

INTRODUCTION

Background and Military Relevance

Initiatives designed to increase soldiers' awareness of the importance of nutrition, to educate soldiers to make appropriate food choices, and to provide a variety of nutritious menu alternatives to the soldiers have been implemented in Garrison Dining Facilities in response to taskings from the Vice Chief of Staff of the Army. Participants attending the Office of the Deputy Chief of Staff for Logistics (ODCSLOG) sponsored October 1985 Worldwide Nutrition Conference identified a need to evaluate effectiveness of the initiatives that have been implemented.

ODCSLOG tasked the Medical Research and Development Command, specifically The Military Nutrition Division, U.S. Army Research Institute of Environmental Medicine, to conduct a series of evaluations and tasked U.S. Army Forces Command (FORSCOM) and U.S. Army Training and Doctrine Command (TRADOC) to provide the test units. Military Nutrition Division requested the participation and collaboration from Behavioral Sciences Division, Science and Advanced Technology Directorate, U.S. Army Natick Research, Development and Engineering Center (NATICK) to examine nutrition awareness and attitudes of soldiers and food service personnel.

The Non-Commissioned Officer (NCO) Academy at FT Riley, KS and its contractor operated NCO Academy Dining Facility were identified as the initial test unit. With the current trend in the Army to contract Garrison Dining Facility operations, ODCSLOG was particularly interested in how well these operations were meeting the nutritional needs of soldiers.

Two studies performed by Letterman Army Institute of Research (LAIR) during the 1970s are relevant to the current study. The first of these was a 10-day study (1) conducted at the Ft. Myer Tri-Service Dining Hall during May 1972.

The purpose of this study was to evaluate effects of this civilian catered feeding system on nutrient consumption and nutritional status of enlisted personnel supported by this facility. Food and nutrient consumptions of the average diner were measured by weighing the total amount of food served, the total plate waste and dividing by headcount. The second study (2) was an assessment of nutrient intakes of male and female cadets at the U.S. Military Academy, West Point, during the 1979-1980 academic year as part of a larger study conducted to determine factors contributing to weight gain by cadets attending the Academy. During this study, dietary intake data of individual cadets was collected for 5 days using a diary-interview technique.

Two previous studies by USARIEM evaluating nutrient consumptions of soldiers performing field training are relevant to the current effort since the same dietary methodology was used. During the seven week Combat Field Feeding System Force Development Test and Experimentation (CFFS-FDTE) conducted during August-September 1985, we developed and validated a direct observation technique to obtain an accurate estimation of nutrient consumption (3). This same technique was used to evaluate nutrient consumptions of Field Artillery soldiers (4) participating in an 8 day sustained operation conducted during May-June 1986. Because of a short term moratorium on the use of the Meal Ready to Eat (MRE), the soldiers were fed 3 A-ration meals per day prepared by military cooks in a Garrison Dining Facility and transported to field sites.

Objectives and Approach

Objectives of this test were:

(1) To evaluate the nutritional adequacy of meals consumed by soldiers eating in NCO Academy Dining Facility.

(2) To evaluate whether the nutrition initiatives implemented at the NCO Academy Dining Facility were working to moderate calorie, fat, sodium and cholesterol intakes.

(3) To assess impact of the Army's nutrition initiatives on the awareness, perceptions, attitudes, behaviors, and knowledge of soldiers eating in and food service personnel working in Garrison Dining Facilities.

The first and second objectives were addressed by The Military Nutrition Division of USARIEM. Trained data collectors gathered actual food consumption data using a direct observation technique. Detailed information presenting methodology, results, and discussion pertinent to this objective will be discussed later in this report. Actual nutrient consumption of the volunteers (group means) were compared with the Office of the Surgeon General Military Recommended Dietary Allowances (5) on a nutrient by nutrient basis to determine whether soldiers met these nutritional recommendations. Information was obtained regarding specific initiatives that have been implemented at the NCO Academy Dining Facility. Consumption data were gathered to provide evaluation of these specific initiatives as feasible.

The third objective was addressed by Behavioral Sciences Division of NATICK using questionnaires and structured interviews. Food service personnel working at the NCO Academy Dining Facility were interviewed to ascertain their perceptions of the nutrition program and to ascertain their adherence to the program. Soldiers eating in the NCO Academy Dining Facility were asked to complete a questionnaire designed to address nutrition knowledge, attitudes, and behaviors. Detailed information on methodology and results concerning this objective will be published as a separate Natick Report.

METHOD

Test Facility

The NCO Academy Dining Facility was selected by FORSCOM to serve as the test facility for this study. The NCO Academy Dining Facility is a contract operated facility. The Dining Facility Manager is required to meet requirements of Army Regulation 30-1 (6) including the implemention of the nutrition initiatives delineated in Appendix J of that Regulation. The contract Dining Facility Manager was not required to use the Army Master Menu and had opted not to do so. The menu used during this study was written by the Dining Facility Manager based on his experience with this student and cadre population. Menus served during data collection days are listed in Appendix A.

The NCO Academy Dining Facility supports the Primary Leadership Development Course (PLDC) and Basic Non Commissioned Officers Course (BNOC) students plus cadre members for both courses. To ensure a study population of sufficient size to provide statistical reliability, the PLDC which averages 180 students per class was selected rather than the BNOC which averages 55 students per class. The study was scheduled to coincide with the class schedule such that data could be collected from the same students on each day of data collection and data collection was scheduled for days during which students were eating in garrison rather than in the field.

Nutrition Initiatives

To assess the impact of specific nutrition initiatives that have been implemented in the NCO Academy Dining Facility, the food advisor was asked to provide information regarding initiatives in place during the study time frame. Information provided in response to this request is shown in Appendix B.

Food consumption data gathered to determine nutrient consumptions were used to evaluate effectiveness of specific initiatives wherever possible. However, specific evaluations could not be made for each of the 18 different initiatives.

Selection and Recruitment of Test Subjects

All members of the Primary Leadership Development Course (PLDC) Class #9-86 (selected to serve as the test population because they were at the NCO Academy during the time frame of the study) attended a general briefing on the purposes of the nutritional assessment study. Students were invited to participate in the test, and 50 volunteers were requested for evaluation of food consumption. The principal investigator discussed specific methodology and responsibilities with the volunteers. After being given an opportunity to ask questions, each volunteering student signed a Volunteer Agreement in accordance with the approved Human Use protocol.

Data were collected from 50 volunteer subjects who comprised a representative sample of the total class. Because only 8% of the class were female, there was not a sufficient female population to provide statistically reliable results. Therefore the test results discussed in this report are based only on data collected from 43 male subjects who completed the entire study.

Volunteers providing food consumption information completed demographic questionnaires (Appendix C) including general personal information and information regarding their usual eating habits. Height and weight data were taken from the students PLDC folders. The NCO Academy uses height/weight data from the Army Physical Readiness Training (APRT) Test Card to verify whether students meet the AR 600-9 requirements. These heights and weights were also

used for this study. It should be noted that students are required to meet height/weight standards in accordance with AR 600-9 (7) to be eligible to attend military training courses such as the PLDC. Since all students were within weight standards, less need for calorie restriction could be expected than in other Army population groups.

All PLDC students are required to eat all meals in the NCO Academy Garrison Dining Facility while attending this course. Therefore, volunteering to participate in this study did not affect a soldier's choice on where he would eat. In addition, food consumed in the Dining Facility provided essentially the total daily nutrient intakes. A noted exception to this policy was that students were allowed to purchase carbonated beverages during the evenings. Data collectors interviewed students regarding beverage consumption on a daily basis to provide evaluation of the contribution of carbonated beverages to total caloric consumption.

Food Consumption Data

Quantities of standard servings actually being used at each meal were weighed and used as visual references by the data collectors. Trained data collectors visually estimated portions served to and portions left by the volunteers, estimating to the nearest 0.1 portion. This method was used and validated during the CFFS-FDTE (3). Manual data collection forms are shown in Appendix D. Use of individual serving packets facilitated quantitative estimation of several key items. Volunteers used individual salt, pepper, and sugar packets rather than using shakers provided on the tables. Use of salt packets was particularly important due to the need to try to quantify the amount of added salt. Use of individual butter and margarine pats and individual packets of salad dressings facilitated more accurate estimates of these key sources of fat.

Data collectors were trained to visually estimate portion sizes at USARIEM prior to the study. The trainer prepared 3 plates of food for the data collectors to practice estimating portion sizes plus a reference plate containing a pre-weighed standard portion of several food items. The 3 plates contained varying fractional portions of the referenced standard plate. The trainer provided feedback to the data collectors on how accurately they were estimating portion sizes. After estimating portions as served, data collectors estimated portions on trays set up to represent trays of leftover, unconsumed food. This training was repeated using breakfast, lunch, and dinner foods.

In addition to the training conducted at USARIEM, data collectors performed a dry run at Ft. Riley prior to actual data collection. During the 3 meals of the dry run, they familiarized themselves with foods served in the Dining Facility and practiced estimating quantities of self-service items. Two data collectors evaluated the same tray independently and results were compared. Volunteer subjects were familiarized with procedures to be used. On the evening prior to initiation of data collection, the data collectors met with their assigned subjects to discuss specific data collection procedures.

Limitations

No direct chemical analyses were performed to determine the nutrient composition of foods served during the study. Nutrient composition information was developed as described later. Information on some nutrients of health concern is lacking or incomplete (e.g., no data were available on dietary fiber and data on folic acid were incomplete).

Fat intake data are limited to total quantity because data on type of fat (i.e., saturated, monounsaturated, polyunsaturated) were incomplete for some items. Lack of baseline data limited the ability to evaluate impact of the

nutrition initiatives. Ideally, consumption after implementation of the nutrition initiatives would have been compared with consumption prior to implementation.

Nutrient Data Base

A nutrient data base was specifically created for this study by monitoring food preparation methods used and recipes followed in the NCO Academy Dining Facility. Standard recipes from the Armed Forces Recipe Service Tri-Service recipe file (8) were used as a basis for developing the data base. Recipe information was obtained for those food items prepared that were not part of the recipe file. Direct observation during food preparation at each meal was used to record deviations from the standard recipes. Professional judgments were used to estimate amounts of sauces and ingredients actually adhering to food products rather than including total recipe ingredients where serving was observed to indicate that the total sauce/juice/gravy was not served to and consumed by soldiers. Actual ingredients and food yields were measured for selected foods. Information on commercial products used was gathered and nutrient composition information was compiled for these items. Actual recipe ingredients were used in selecting appropriate items from the University of Massachusetts Nutrient Data Base to compute the nutrient composition of each recipe used during the study. Nutrient information was compiled to provide nutrient data on a per serving and a per 100g basis.

Weather Data

Although meals were consumed indoors and weather would have less effect on food consumption than would be expected in a field study, the heat/humidity may

have affected appetites. Therefore, weather data were recorded on the two warmest days of the study (Appendix E.)

Activity Data

The training schedule was used to evaluate activity levels of the soldiers. Although only crude estimates could be made using this approach, these data were felt useful in interpreting energy consumption levels.

RESULTS

Demographics

Information needed to describe the test population was gathered by administering a previously described written questionnaire prior to collection of food consumption data. Based on answers supplied by the soldiers, average age was 25 years old and average time in the Army was 4.5 years. Fifty-eight percent of the population were E-4s and forty-two percent were E-5s. The breakdown by racial category was 74% white, 19% black, 2% hispanic, and 5% other. Sixty-three percent replied they do use tobacco, and thirty-six percent responded they do not use tobacco. Use of vitamins or vitamin/mineral supplements was confined to 7% of the population. Although all soldiers met height/weight standards of AR 600-9, 47% stated they desired to lose weight, 19% stated they desired to gain weight, and 34% reported satisfaction with present weight.

Food Consumption

Results presented are based on the 43 male subjects who completed the entire study. Average daily intakes calculated by collapsing individual data over the entire 7-day study were compared with the Office of the Surgeon General Military Recommended Dietary Allowances (MRDAs) provided in AR 40-25 (5). Comparison of actual intakes (group means for each nutrient) with MRDA levels are presented in Table 1.

TABLE 1

Comparison of Average Daily Consumption of Selected Nutrients (X ± SD) with OTSG Recommended Intake Levels

Nutrient	Average Daily Intake	MRDA Level
Energy (kcal)	3112 ± 758	2800-3600
Protein (g)	123 ± 31.2	100
Vitamin A (mcg RE)	1376 ± 1305	1000
Ascorbic Acid (mg)	164 ± 92	60
Thiamin (mg)	2.3 ± 0.8	1.6
Riboflavin (mg)	2.5 ± 1.0	1.9
Niacin (mg)	26.7 ± 9.3	21
Vitamin B_{12} (mcg)	4.7 ± 2.0	3.0
Calcium (mg)	1335 ± 597	800-1200
Phosphorus (mg)	2020 ± 590	800-1200
Iron (mg)	17.7 ± 4.5	10-18

Comparison of total energy consumed with MRDAs indicated soldiers consumed sufficient energy (3112 kcal/day) to meet the 2800-3600 kcal/day recommended range for moderately active males. This intake was based on 3 meals per day consumed in the Dining Facility. Students were allowed access to soda machines in the evenings. Data were collected on actual usage, and average caloric intakes from snacks were computed to allow calculation of actual total daily caloric intakes. Snacks were estimated to have provided an additional 80 kcal/day and thus raised total daily intakes to approximately 3192 kcal/day. Total daily caloric intakes were consistent with the light-moderate energy expenditure activity patterns students followed during this study and should have been appropriate to maintain body weight within narrow limits.

Mean daily protein intake of 123 ± 31 g met the MRDA level of 100 g per day. This level of intake is more than adequate to meet the needs of this population group.

Total fat intake averaged 130 ± 43 g per day. The MRDA for fat indicates that a maximum of 35% of total calories should be provided as fat. Fat consumed contributed 37.5% total calories exceeding the target level by 2.5%.

The MRDA for carbohydrate is also expressed in terms of percentage total calories. Although carbohydrate is not included in the table of nutrients with specific MRDAs in AR 40-25, the text provides a guideline of 50-55% of total calories to be supplied by carbohydrate. Following this guideline, soldiers consuming 2800-3600 calories should consume 350-495 g of carbohydrate per day. Average daily intakes of 367.9 ± 101 g met the target range.

Intakes of vitamins and minerals, except sodium, met MRDA levels as depicted in Figures 1 and 2, respectively. Sodium intake is not included on the graph of mineral intakes, as it will be discussed separately in further detail. Intake of vitamin B_6, folacin, magnesium, and zinc were not included since food composition data were felt to be incomplete and comparisons would lead to misleading conclusions. Although there are MRDAs for vitamin D, vitamin E, and iodine, lack of food composition data precluded evaluation of the adequacy of these nutrients.

Nutrition initiatives have been implemented to decrease calorie, fat, cholesterol, and sodium intakes. Because all soldiers in the test population were at appropriate body weight (within AR 600-9 standards), use of low calorie menu items was very low and therefore, not evaluated per se. Actual daily intake of fat has already been discussed. Cholesterol intake averaged 761 ± 296 mg per day. Currently, there is no OTSG recommendation for cholesterol intakes of healthy soldiers. Therefore, daily intake cannot be evaluated by the method used for other nutrients; but descriptive data concerning sources of cholesterol in the diet will be discussed.

FIGURE 1

AVERAGE DAILY VITAMIN INTAKES COMPARED WITH MRDA VALUES

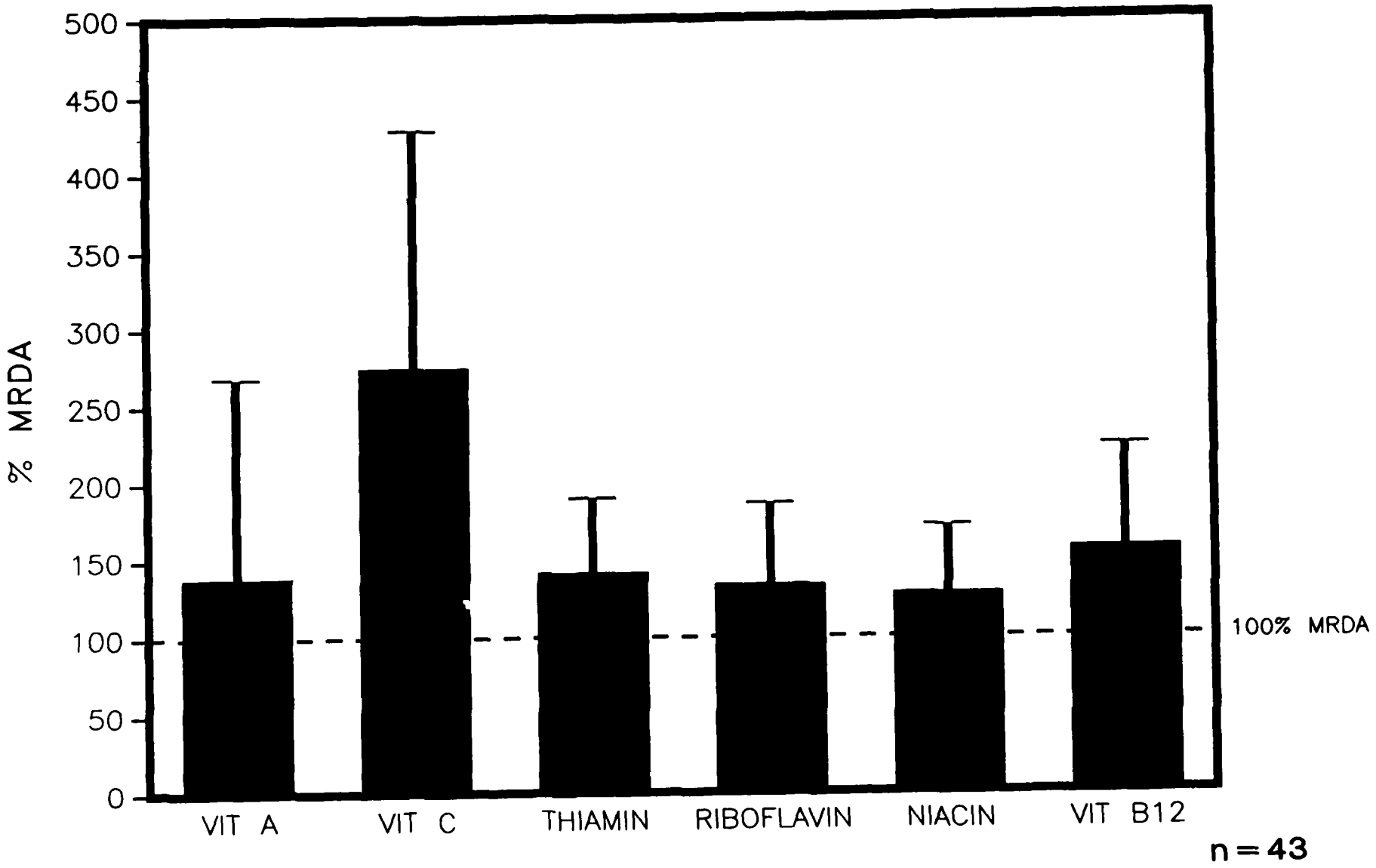
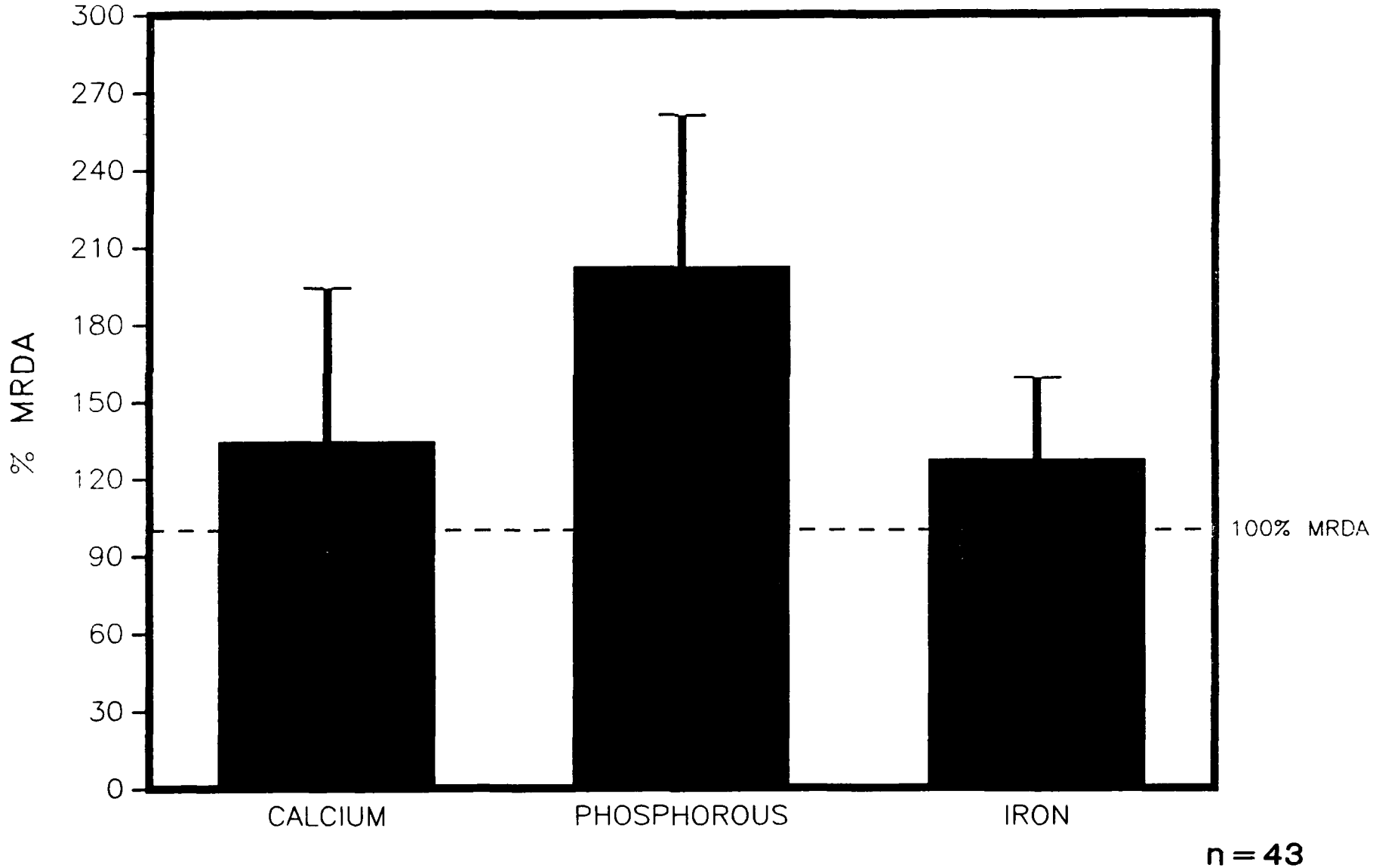


FIGURE 2

AVERAGE DAILY MINERAL INTAKES COMPARED WITH MRDA VALUES



The stacked bar graph shown at Figure 3 demonstrates average daily cholesterol intakes for each of the 7 days of the study. Mean intake levels were relatively consistent over time with a range of 670-915 mg/day. Figure 4 demonstrates the cholesterol contribution of the breakfast, lunch, and dinner meals on each day. The breakfast meal consistently supplied a greater level of dietary cholesterol (325-475 mg/day) than did either the lunch or dinner meals (125-260 mg/meal). Eggs served at breakfast supplied the bulk of the cholesterol as depicted by the stacked bar graph at Figure 5. The solid bars show amount of cholesterol contributed by eggs, and the crosshatch area shows cholesterol provided by other breakfast foods.

Total daily sodium intake averaged 5668 $\pm$ 1705 mg. Amounts of sodium contributed by food as served and by salt added by the soldiers are presented in Figure 6. Contribution of added salt was consistent over each of the 7 days and contributed approximately 10% of total sodium consumed. The OTSG recommendation for sodium intake for garrison feeding has been established as a range of 1400-1700 mg sodium per 1000 kcal. Computed on this basis, daily intake averaged 1821 mg sodium per 1000 kcal. Comparison with the recommendation showed average daily intake exceeded the upper limit of the recommended range by 7%. Figure 7 demonstrates graphically the average daily sodium intakes compared with the MRDA range. The stacked graph presented in Figure 8 shows this comparison adding the sodium contributions of food as served and discretionary salt used. With the exception of day 1, the sodium intakes per 1000 kcal from the food as served was within the OTSG recommendation.

FIGURE 3

AVERAGE DAILY CHOLESTEROL INTAKES ON A PER MEAL BASIS

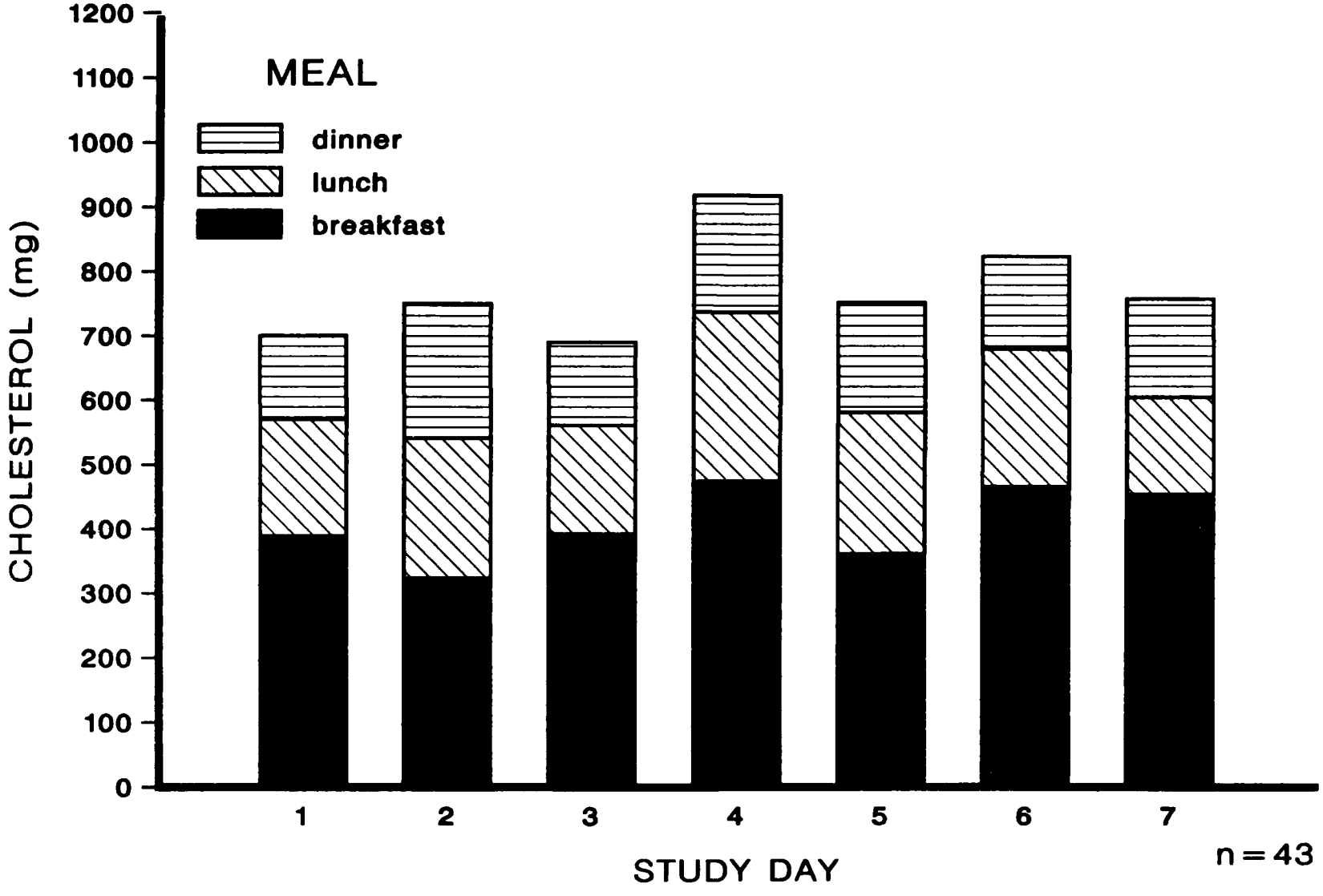


FIGURE 4

AVERAGE DAILY CHOLESTEROL INTAKES ON A PER MEAL BASIS

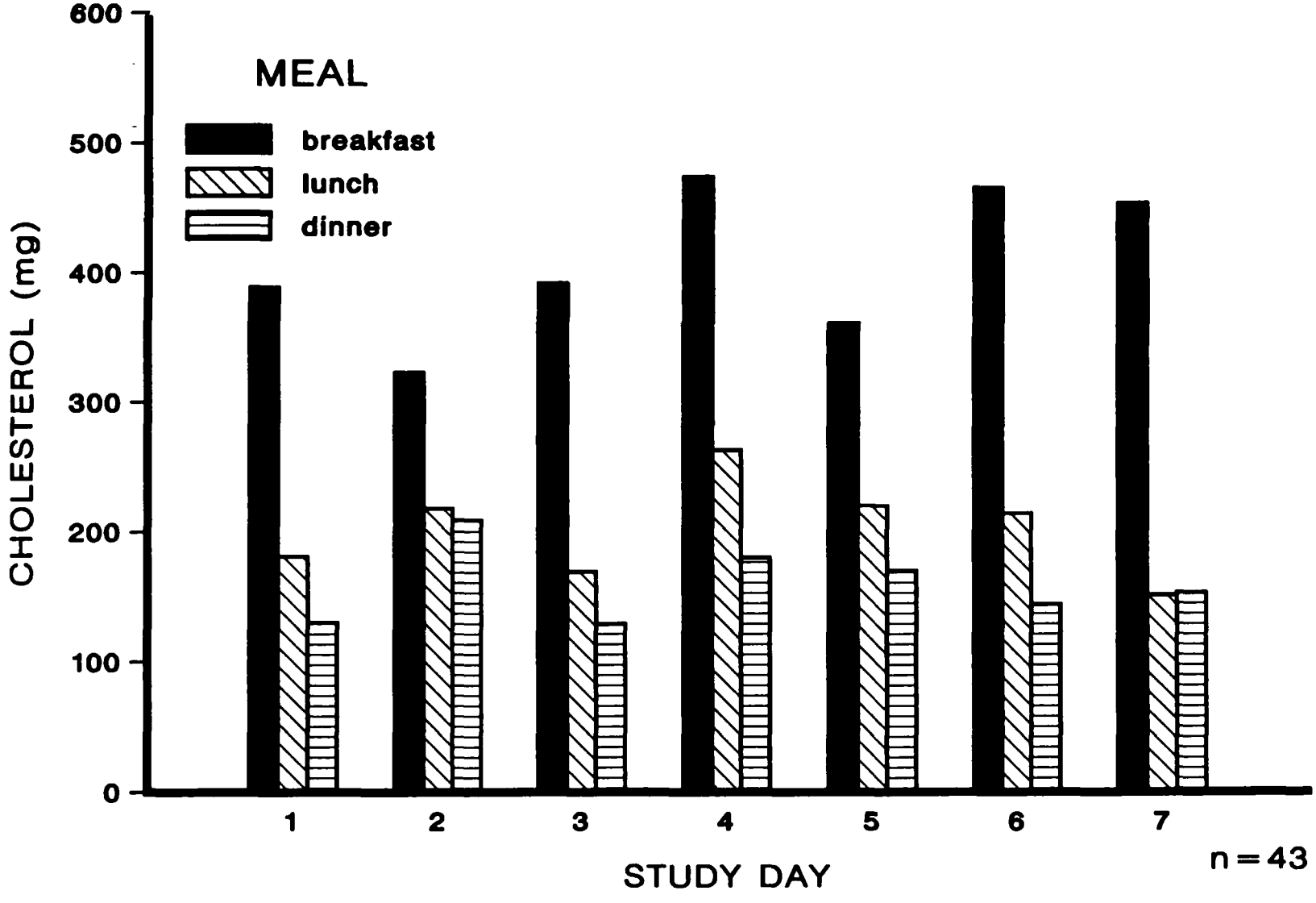


FIGURE 5

AVERAGE BREAKFAST CHOLESTEROL INTAKES

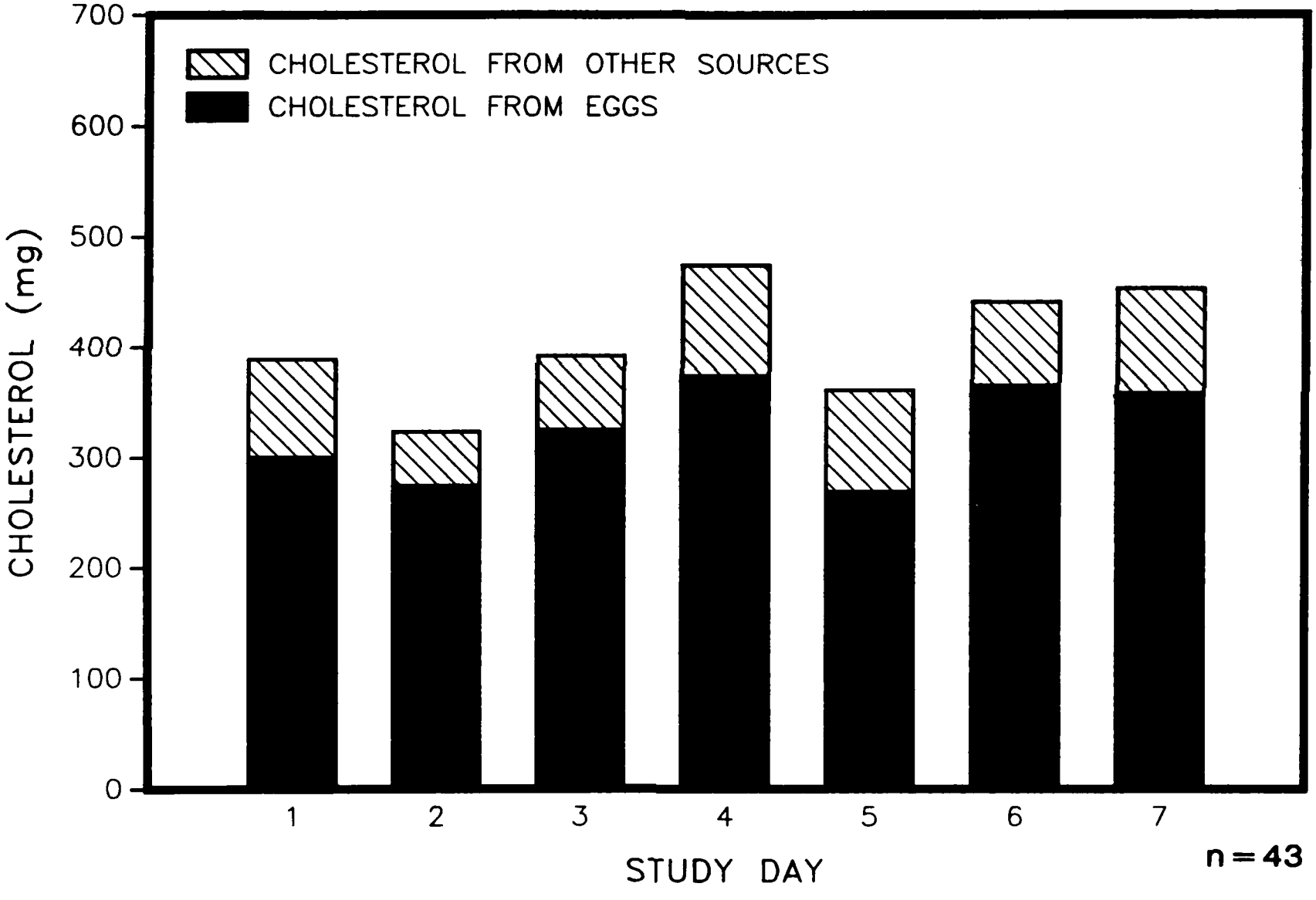


FIGURE 6

AVERAGE DAILY SODIUM INTAKES

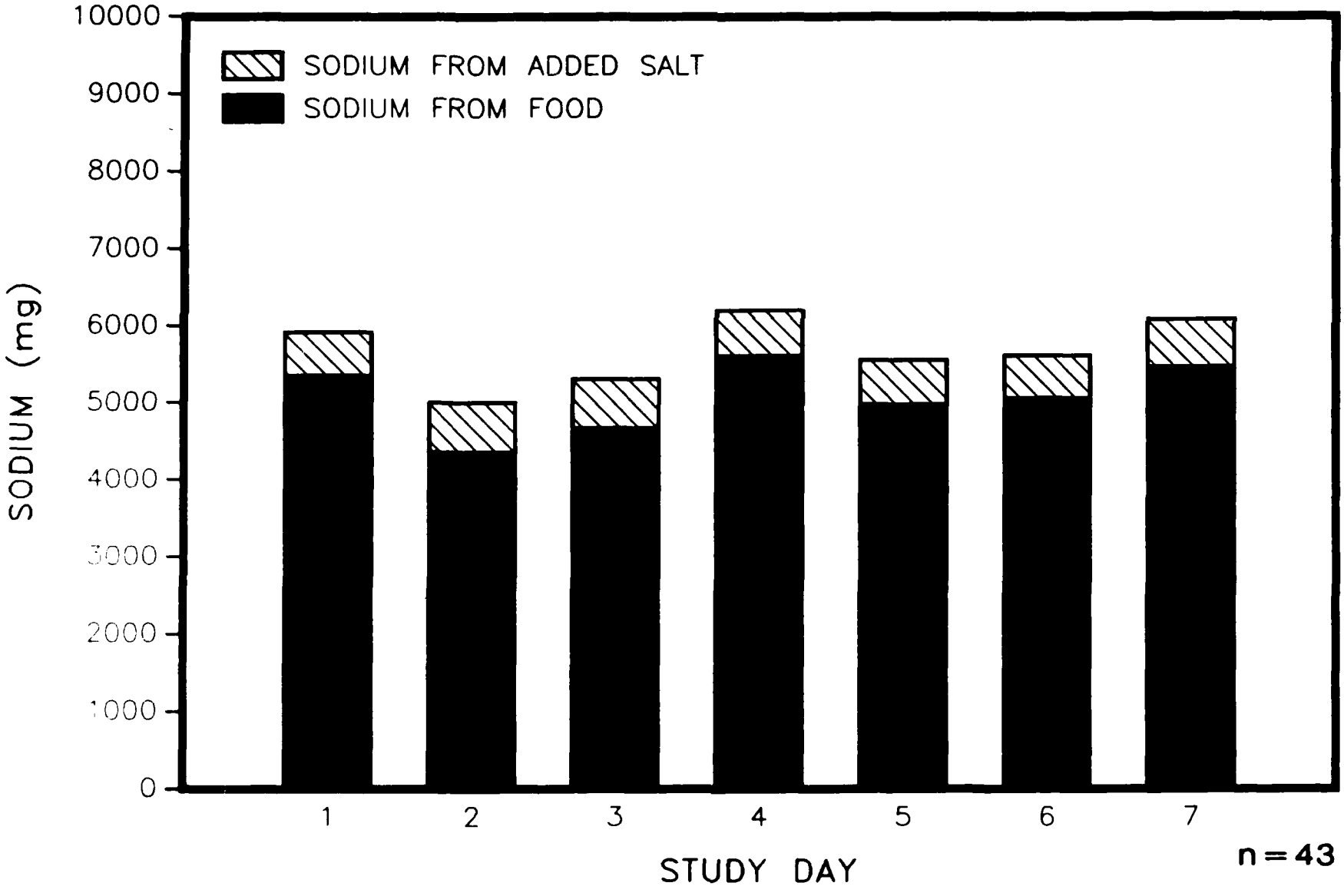


FIGURE 7

AVERAGE SODIUM INTAKE PER 1000 CALORIES

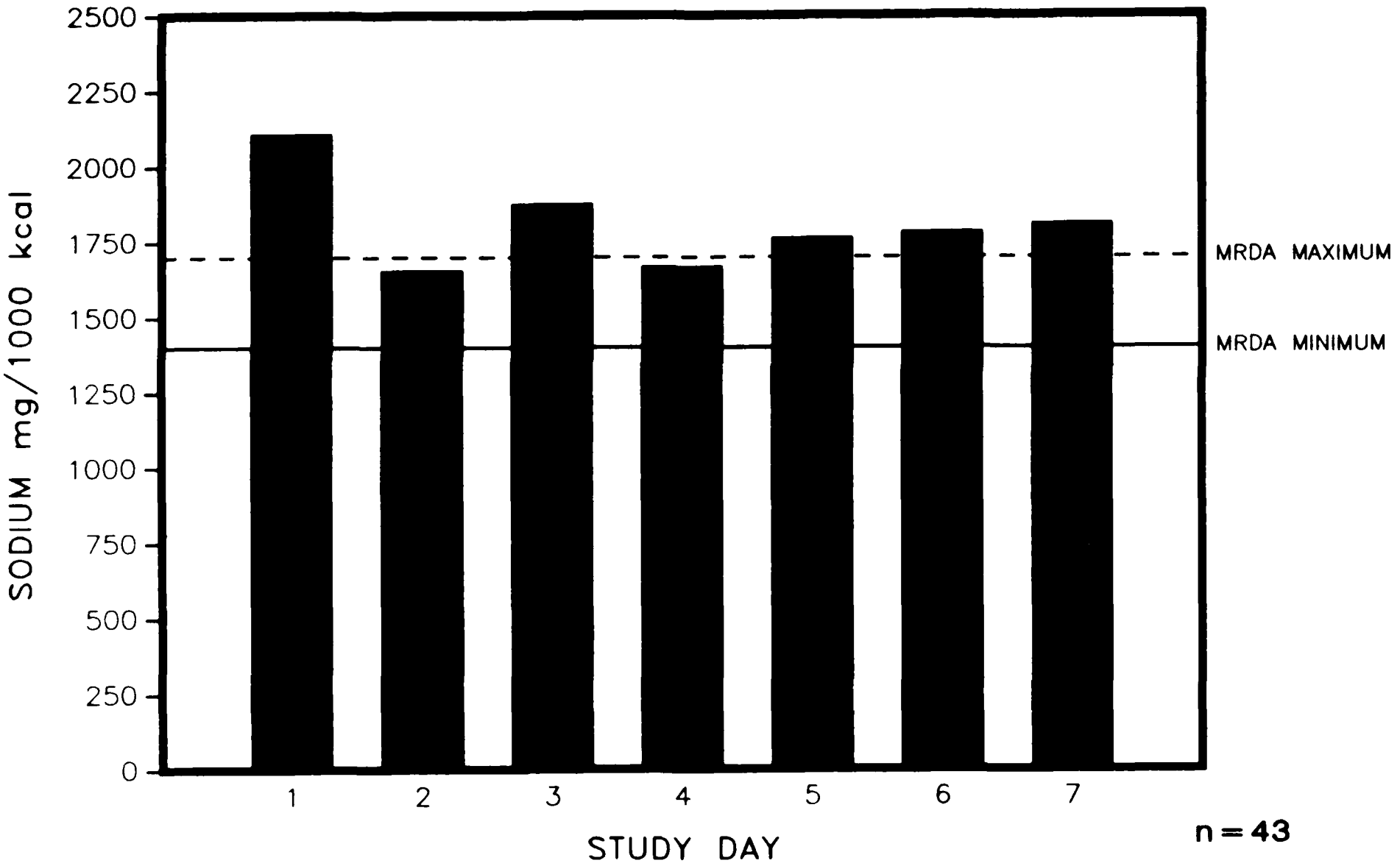
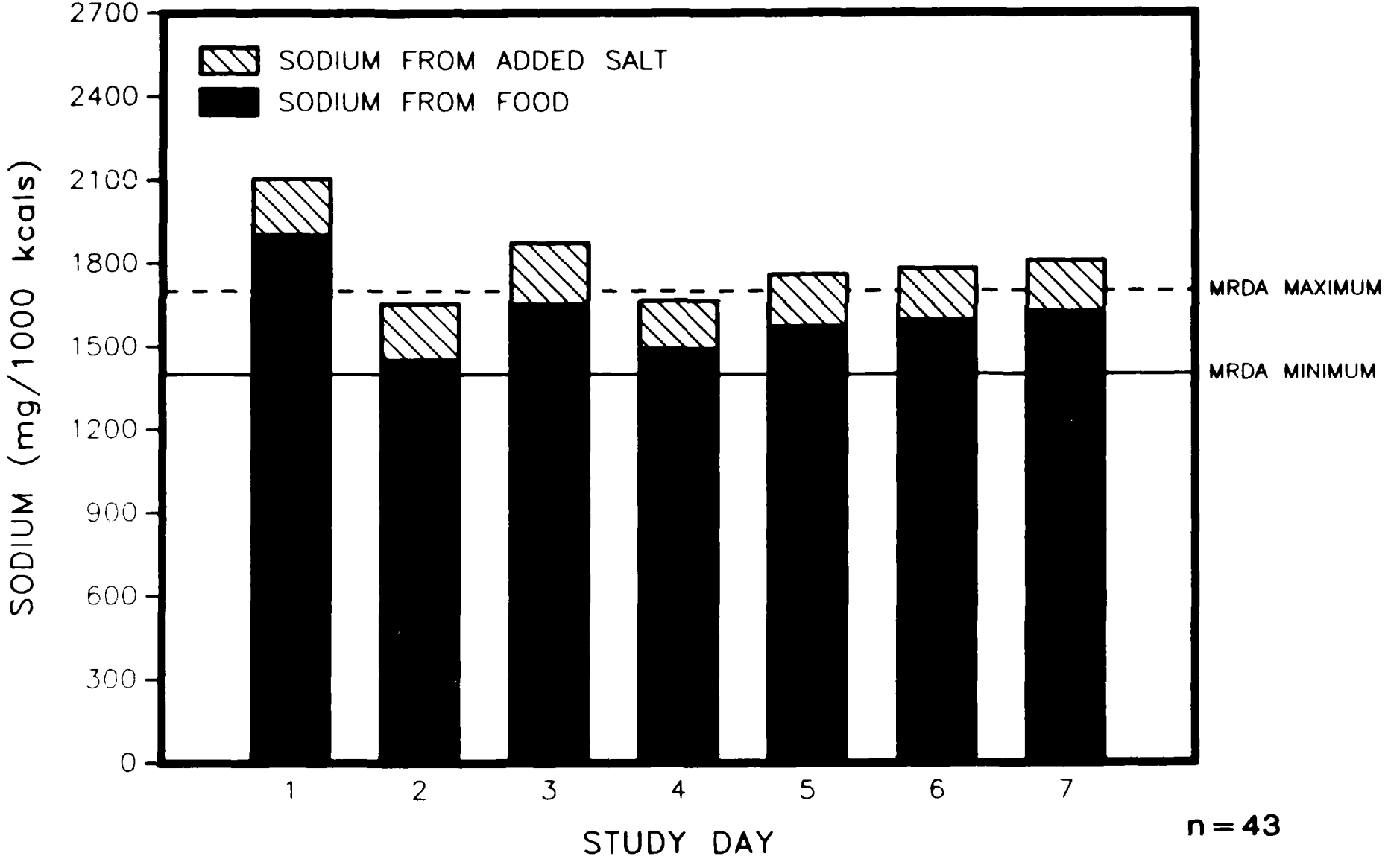


FIGURE 8

AVERAGE DAILY SODIUM INTAKES



DISCUSSION

Meals consumed in this contractor operated Dining Facility were nutritionally adequate for these male soldiers based on group mean comparisons with the OTSG recommendations for selected nutrients. Soldiers consumed greater than 100% of MRDAs for protein and vitamins and minerals evaluated. Therefore, use of a vitamin/mineral supplement for male soldiers eating regularly in this Dining Facility seems unnecessary. Whether female soldiers eating regularly from the same menus, but predictably consuming fewer calories, would also meet all vitamin/mineral recommendations cannot be answered from these data, and this issue will have to be addressed in future studies. Since all soldiers were required to eat all meals in this Dining Facility, soldiers did not have the usual option of eating some meals from other food sources. Therefore, whether soldiers eating meals from a wide variety of sources (home, restaurants, fast food outlets) would meet nutritional requirements cannot be determined from these data.

Data were collected to evaluate specific nutrition initiatives wherever possible. Evaluation of nutrition initiatives implemented to decrease fat, cholesterol, and sodium intakes will be discussed in further detail.

Fat

Low fat (2% fat) milk was used as the sole milk source throughout the study. Low fat chocolate milk was available each day. No whole milk, skim milk, nor buttermilk was served. The nutrition initiative to use low fat (2% fat) milk instead of whole (3.3% fat) milk as the primary bulk milk source had been implemented to reduce total daily fat intakes. To determine the impact of

this initiative, the amount of fat that would have been consumed if whole milk had been used was computed, omitting chocolate milk consumption. These data are presented in Table 2 and an assumption was made that the total volume of milk consumed would not have changed. The data are presented for "all subjects" (those who consumed milk and those who did not), and for "milk consumers" (defined as those subjects who consumed milk at least once during the study). Milk consumers comprised 29 of 43 subjects, or 67.5% of the sample.

For milk consumers, average daily quantity consumed was 502 g, or approximately 2 cups. Were this quantity consumed as whole milk, the percentage of calories consumed as fat would rise from 37.8% to 39.1%, a difference of 1.3% in fat calorie consumption. Cholesterol consumption would increase by 30 mg. For all subjects, average daily consumption drops to 215 g, or less than 1 cup. A difference of 0.6% in the percentage of calories consumed as fat would be achieved in this case, rising from 37.6% to 38.2%. Cholesterol consumption would increase by 14 mg.

Other initiatives to decrease fat intake such as having low fat yogurt, cottage cheese, and calorie restricted salad dressings available as alternatives had little impact on total fat consumption. Yogurt was consumed by only 1-2% of the population. At breakfast, it was taken in addition to eggs. At lunch/dinner meals, soldiers took it in addition to baked desserts. Cottage cheese was consumed by 11-20% of soldiers at 5 lunch/dinner meals during the study. However, in all cases, it was taken with an entree, burger, or sandwich. Both calorie restricted and regular salad dressings were available on the salad bar at the lunch/dinner meals. Usage data indicates that 23% of the soldiers selected regular salad dressing, 7% of the soldiers selected low calorie salad dressing, and 70% of the soldiers did not select salad dressing. For the majority (70%) of soldiers, salad dressing did not contribute to total fat consumed.

TABLE 2

BENEFITS OF SUBSTITUTING LOW FAT (2%) MILK FOR WHOLE MILK

Milk Consumers

	Total Daily Intake With 2% Fat Milk	Intake from 2% Fat Milk	Intake if 3.3% Fat Milk	Total Daily Intake With 3.3% Fat Milk
Energy (kcal)	3226	251	306	3281
Fat (GM)	135.5	9.7	16.8	142.6
(% Fat Cal)	37.8			39.1
Cholesterol (Mg)	803	40	70	833
Quantity (g)	--	502	502	--

n = 29 consuming milk at least once during 7 day study

All Subjects

	Total Daily Intake With 2% Fat Milk	Intake from 2% Fat Milk	Intake if 3.3% Fat Milk	Total Daily Intake With 3.3% Fat Milk
Energy (kcal)	3112	107	131	3137
Fat (GM)	130	4.1	7.2	133.1
(% Fat Cal)	37.6			38.2
Cholesterol (Mg)	761	16.1	30.1	775
Quantity (g)	--	215	215	--

n = 43 with 29 consuming milk at least once during 7 day study

Cholesterol

Initiatives implemented to decrease cholesterol consumption included serving margarine as an alternative to butter and serving alternatives to eggs at breakfast meals. Margarine was available in addition to butter on 2 days of the 7-day study. However, food consumption data collected did not allow meaningful interpretation of the impact. Soldiers seemed unaware of the choice provided, as soldiers were noted to have taken combinations such as 1 pat margarine and 1 pat butter. The percentage of the population choosing each could not be computed.

Breakfast alternatives to egg entrees such as yogurt and cereals were available daily. Results of the yogurt alternative were already discussed, and the point that yogurt was taken by only 1-2% of the population in addition to eggs was stated. Cereals were more popular, as they were consumed by 10% of the population. However, 7% of soldiers ate cereal in addition to eggs, and only 3% of soldiers used it as a substitute for eggs.

Egg entrees were popular, and eggs were consumed by 95% of the population. Providing a cholesterol-free egg product may be a more successful method of decreasing total cholesterol intake than expecting soldiers to give up eggs at breakfast. Potential impact of substituting cholesterol-free egg substitutes for scrambled eggs is shown in Table 3. Table 3 shows the amount of cholesterol contributed by eggs based on actual consumption data. Total daily cholesterol intake could be reduced by approximately 226 mg per day if cholesterol-free egg substitutes were used in place of eggs and if the levels of consumption did not change. Furthermore, the use of cholesterol-free egg substitute would lower fat calorie intakes by about 1% since this product has less fat than regular scrambled eggs. Naturally, these products could not be

used for boiled eggs or fried eggs, but they could be used successfully as scrambled eggs and in omelets. Scrambled eggs were highly selected at Ft. Riley, and data presented are based on consumption of scrambled eggs. Time constraints placed on soldiers in being served and eating may have been responsible for the selection of scrambled eggs that were ready rather than waiting for eggs to be cooked to order. Whether scrambled eggs would be as popular in other facilities is not known.

Sodium

Nutrition initiatives implemented to reduce sodium consumption included providing sodium-free herbal seasoning as an alternative to table salt and reducing salt in recipes by 25%. Although herbal seasoning was provided on the tables in the Dining Facility, its impact on sodium consumption could not be evaluated. The product used was too caked from the heat and humidity to shake it from the shaker containers.

Army recipes used during this study were Change 1, TM 10-412, which include a 25% salt reduction. However, on receipt of the ODCSLOG/OTSG message to decrease salt by 25%, the Dining Facility Manager had instructed the cooks to compute a 25% salt reduction and adjust each recipe as they prepared each product. Monitoring of food preparation showed cooks were following guidelines to reduce salt per se; however, they sometimes added flavorings such as monosodium glutamate to selected food items. Cooks were responsible for calculating the amount of salt to be added to each recipe and cook to cook variations were noted during this study. Nutrient consumption data were calculated based on actual food preparation.

Added salt accounted for 10% of total sodium consumption. Sixty-seven percent of soldiers used added salt and 33% of soldiers did not add salt. The majority of soldiers (75%) were consistent in usage or non-usage of added salt.

TABLE 3

SCRAMBLED EGGS AS A POTENTIAL MODIFIER OF CHOLESTEROL INTAKE

	With Whole Eggs		With Egg Substitute	
	Total Daily Intake	Intake from Scrambled Eggs	Intake if Egg Substitute	Total Daily Intake
Energy (kcal)	3112	87	15	3040
Fat (gm)	130	7	1	124
Fat (% total kcal)	37.6			36.8
Cholesterol (mg)	761	226	0	535
Cholesterol (mg/1000 kcal)	245			176
Sodium (mg)	5668	144	33	5558
Quantity (gm)	--	59	59	--

n = 43 males, with 41 consuming eggs at least once during 7 day study

Comparison with Other Food Consumption Studies

Military Populations

Comparing data from this study with that from other recent military food consumption studies demonstrates several similarities and some noteworthy differences in average daily intakes. Table 4 shows a comparison of this study with field studies conducted at Ft. Sill and Pohakuloa Training Area (PTA) and a Dining Facility study at West Point. Although the study at Ft. Sill (4) involved 8 days of sustained field operations, the field artillery soldiers ate A-rations rather than the Meal, Ready-to-Eat (MRE) ration that would normally be used during field training. A-rations served were prepared in a Garrison Dining Facility and transported to the field by the military cooks. Food consumption data taken during the 44 day CFFS-FDTE conducted at PTA (3) are shown for division artillery soldiers eating 2 A-rations/1 MRE or 2 Tray Pack rations (T-rations)/1 MRE per day. Data on T-rations are of particular interest since this is a newly developed ration designed to reduce labor requirements on battlefields of the future. Each of these studies was done using the same direct observation method in collecting food consumption data. The Dining Facility study at West Point (2) evaluated intakes of male and female Cadets attending the Academy.

Average intakes of calories, fat, cholesterol, and sodium from each study are shown in Table 4. The energy intakes of NCO students (3112 kcal) at Ft. Riley and of artillery soldiers (3047 kcal) eating 2 A-rations/1 MRE during the CFFS-FDTE were similar and near the lower limits of the MRDA range for energy (2800-3600 kcal) for moderately active males. The lower energy consumption seen in the 2 T-ration/1 MRE group (2689 kcal/day) was due to lower calorie consumption at T-ration meals reflecting a lower acceptability of some T-ration menu items. The greater energy intakes seen in the Ft. Sill study (3713 kcal) were felt to be due to the increased energy expenditures of sustained artillery

operations and to the popularity of the A-rations served. The energy consumptions of male West Point Cadets (3738 kcal) were appropriate to meet the demands of their heavy physical training schedule.

Percentage of calories supplied by fat noted at Ft. Riley were similar to those noted previously at Ft. Sill and West Point where low fat milk was also offered. Nutrition initiatives had not been implemented for the 2 A-ration/1 MRE menus served during the CFFS-FDTE. The A-ration served included whole milk, gravies with most meat entrees, butter instead of margarine and baked cookies and cakes as the primary desserts. The lower percentage of fat calories seen with the 2 T-ration/1 MRE was due to serving lean meats without gravies, the use of fruits (fat free) instead of baked goods for desserts and the fact that milk was not offered with the T-ration menus. These menu differences were reflected with 42% fat calorie intakes from the 2A/1 MRE compared to only 31% fat calories in the 2T/1 MRE ration.

The relatively high daily cholesterol intakes seen at Ft. Riley (761 mg/day), Ft. Sill (749 mg/day), and with the 2 A-ration/1 MRE at PTA (770 mg/day) were primarily due to the high rate of consumption of eggs at the breakfast meal. Fresh eggs were available daily and consumed by the majority of soldiers in each of these studies. Although a canned egg and ham product was available daily for the 2 T-ration/1 MRE group, it was not popular, and low consumption rates resulted in much lower (294 mg/day) cholesterol intake. At West Point, eggs were served at some but not all breakfast meals and cholesterol intakes averaged 599 and 403 mg/day for male and female Cadets, respectively.

Sodium intakes seen at Ft. Riley, Ft. Sill, and PTA all exceeded the OTSG recommended range of 1400-1700 mg sodium per 1000 kcal for garrison feeding. Lower levels seen at West Point cannot be compared with these levels as shown because quantity of discretionary salt used by the cooks and the Cadets was not included in the data collection methodology.

TABLE 4

COMPARISON OF FT. RILEY DATA WITH OTHER RECENT NUTRITIONAL EVALUATIONS OF MILITARY FEEDING SYSTEMS - AVERAGE DAILY INTAKES OF SELECTED NUTRIENTS

	Garrison NCO Acad. Ft. Riley	3A-rations Ft. Sill	2A/1 MRE CFFS-FDTE	2T/1 MRE CFFS-FDTE	USMA-West Point Male	Female
Energy (kcal)	3112	3713	3047	2689	3738	2454
Fat (% total cal)	38	37	42	31	39	39
Cholesterol (mg)	761	749	770	294	599	403
Cholesterol (mg/1000 kcal)	245	202	253	109	160	164
Sodium (mg)	5668	7441	5454	4749	[a]4048	[a]2764
Sodium (mg/1000 kcal)	1821	2004	1805	1757	[a]1083	[a]1126

[a]Food as served, does not include added salt.

Civilian Population

Data from this food consumption study should also be compared with intake levels for the general American population since Army personnel form a subset of this population. The United States Department of Agriculture (USDA) and Department of Health and Human Services (DHHS) operate the National Nutrition Monitoring System which includes a data base for nutrients consumed by Americans plus selected health and nutritional status parameters (9). The dietary data were taken primarily from the USDA Nationwide Food Consumption Surveys (NFCS) and the health/nutritional status data from the DHHS National Health and Nutrition Examination Survey (NHANES). The dietary data for individuals were based on 3-day intakes of participants with day 1 being collected by 24 hour recall and days 2 and 3 using food records. Data available for comparison were from the 1977-78 survey. More recent data is also available from the 1985 NFCS Continuing Survey of Food Intakes by Individuals (CFSII) using 1 day intakes (10).

Data on average daily intakes of selected nutrients for males are provided at Table 5. Percentage of total calories supplied by fat was lower in the Ft. Riley Dining Facility study (37.6%) than observed during 1977-78 NFCS (42%) but higher than observed in the 1985 CFSII (35.2%). Cholesterol intakes on a mg/day basis were higher at Ft. Riley. Having fresh eggs readily available on a daily basis may have encouraged this greater consumption level. When normalized for total caloric intake, the difference in cholesterol intake levels is reduced but still higher in Army population. The NFCS sodium figure takes into account only that sodium naturally available in the food and does not include salt added in cooking and at the table. The national surveys strongly suggest that the civilian population is modifying their food intake

patterns to reduce fat, sodium and cholesterol intakes. With the exception of cholesterol, patrons of the FT Riley NCO Dining Facility were following those trends.

TABLE 5

COMPARISON WITH NATIONWIDE FOOD CONSUMPTION SURVEY
AVERAGE DAILY INTAKES OF SELECTED NUTRIENTS

	NCO Academy Dining Facility	1977-78 Nationwide Food Consumption Survey[a]	1985 Continuing Survey of Food Intake[d]
Fat (% of total kcal)	37.6	42	35.3
Cholesterol (mg)	761	511	443
Cholesterol (mg/1000 kcal)	245	226	177
Sodium (mg/1000 kcal)	1821 (1612)[c]	1551[b]	1464[b]

[a]Data for males ages 19-64 years
[b]Does not include added salt (cooking and at table)
[c]Sodium from food as served
[d]Data for males ages 19-34 years

SUMMARY

The first of a series of garrison feeding system evaluations was conducted at the NCO Academy Dining Facility at Fort Riley, Kansas during July-August 1986. The major objective of the 7-day study was to assess the nutritional adequacy of meals consumed by soldiers eating in an NCO Dining Facility, as well as to evaluate whether ODCSLOG initiatives implemented at the NCO Academy Dining Facility were working to moderate calorie, fat, sodium and cholesterol intakes. Total daily food item consumption and nutrient intakes were evaluated for 43 male NCO cadets consuming three meals per day in the contract-operated dining facility. Study results suggest that many of the ODCSLOG initiatives have been implemented by the contractor, including serving low fat milk, and reducing the salt content of some of the reciped items by 25%.

Use of low fat milk instead of whole milk helped to reduce fat intakes of milk drinkers by 1.3%. Fat intakes were 37.5% of total calories, 2.5% greater than the target level of 35% (or less). Approximately 57% of the total fat intake was from food items that were prepared using the Armed Forces Recipe File. The reciped items contained approximatley 45% of the calories as fat while non-reciped items contained 39% fat calories. The average cholesterol intake of the NCO cadets (761 mg/day or 245 mg/1000 kcal) was 2.5 times the levels (<300 mg/day or 100 mg/1000 kcal) recommended by The American Heart Association. Eggs, consumed by 95% of the test population at the breakfast meal, contributed 42% of the total dietary cholesterol. Lower fat and cholesterol alternatives offered at meals (i.e., lowfat yogurt, cottage cheese, cereals, and reduced calorie salad dressings) were not effective in reducing consumption of the higher fat and cholesterol items.

Total sodium intake (5668 mg/day or 1821 mg/1000 kcal) was 10% greater than the target range of 1400-1700 mg/1000 calories. Food items prepared using the Armed Forces Recipe File contributed approximatley 50% of the total sodium intakes of the cadets, while non-reciped food items were similar in their sodium concentrations (mg/1000 calories.) Added salt comprised 10% of the cadets' total sodium intake; 67% of the soldiers used added salt while 33% did not add salt to their food.

Intakes of protein, carbohydrate, vitamins and other minerals all met or exceeded OTSG recommendations, and the daily caloric intake of the cadets (all within wt/ht standards) averaged 3112 $\pm$ 758 calories, well within the MRDA range of 2800-3600 calories/day.

Recommendations

1. Efforts should be continued to lower fat consumption to 35% or less of total calories. Implementation of and compliance to Army Regulation 30-1 (6) requirements for menu, food preparation and serving standards should be enforced and monitored in all garrison dining facilities.

2. Low cholesterol egg substitutes should be evaluated for the effectiveness, feasibility, and acceptibility of using them to replace scrambled eggs at the breakfast meal in an effort to reduce total daily cholesterol consumption. A reduction in the frequency by which eggs are offered on a weekly basis in a dining facility should also be evaluated for acceptibility with emphasis on a variety of acceptable alternatives.

3. Revision of the Armed Forces Recipe File and non-reciped items to further reduce sodium in prepared foods should be continued. When reducing sodium, a variety of herbs and spices should be substituted in place of salt and other high sodium seasonings to insure palatability.

4. Comparison of nutrient intakes in military operated dining facilities as well as additional contractor operated dining facilities should be made to further evaluate the effectiveness of ODCSLOG initiatives, and the consistency among Active Army dining facilities to comply with the Nutritional Standards for Garrison Dining Facilities outlined in Army Regulation 30-1. Efforts should be directed toward including female soldiers in future evaluations.

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APPENDIX A

A copy of the menu actually served on each day of the food consumption study is provided in this appendix. Usage of leftovers at meals has been annotated using (l/o) to designate a leftover food item.

The breakfast menu consisted of a variety of foods all available on a daily basis were as follows:

Chilled Fresh Fruit
Chilled Fruit Juices
Buttered Grits
Baked Bacon Slices
Assorted Dry Cereals
Baked Sausage Links
Creamed Ground Beef
Hash Browned Potatoes
Baking Powder Biscuits
Fried Eggs
Scrambled Eggs
Hard Cooked Eggs
French Toast
Griddle Cakes
Hot Maple Syrup
Melted Butter
Toast
Butter/Margarine
Jam/Jelly
Assorted Pastries
Assorted Yogurt
Milk
Coffee
Tea/Lemon Wedges

Pastries served varied from day to day and were as follows:

29 Jul 86 - Doughnuts
Sweet Rolls
30 Jul 86 - Coffee Cake w/Streussel Topping
31 Jul 86 - Kolaches
Cinnamon Rolls
Cinnamon Twists
1 Aug 86 - Cinnamon Rolls
2 Aug 86 - Kolaches
4 Aug 86 - Cinnamon Rolls With Nuts
5 Aug 86 - Kolaches
6 Aug 86 - Kolaches
Cinnamon Rolls with Nuts

On 31 Jul 86 and 6 Aug 86, peanut butter and honey were available. Fruits served 29 Jul - 4 Aug 86 were limited to oranges and apples. Bananas were served on 5 Aug 86. On 6 Aug 86 assorted fruits including oranges, peaches, grapes, and pears were served at the salad bar area.

Lunch and supper menus included standard short order, sandwich, salad, soup, fruit, yogurt, bread, ice cream, and beverage items. These are listed below, and daily menus follow specifying those items that varied from day to day:

Short Order
Grilled Hamburgers
Grilled Cheeseburgers
Hamburger Buns
French Fries

Sandwiches
Egg Salad
Tuna Salad
Cheese

Salad Bar
Shredded Lettuce
Tomato
Cucumber
Green Pepper
Bologna
Grated Cheese
Hard Cooked Egg

Ham and Cheese	Bread
BLT	Butter/Margarine Patties
Hoagie	
Corn Chips or Potato Chips	Beverages
Chef's Salad	2% Fat Milk
Chef's Soup Du Jour	Chocolate Milk (2%)
	Coffee
Assorted Yogurt	Tea
Assorted Fresh Fruit	Koolaid
Assorted Ice Cream	Carbonated Beverages

29 July 1986 (Day 1)

Lunch	Dinner
Baked Lasagna	Stuffed Green Peppers
Chicken Curry	Baked Ham/P/A Sauce
Parsley Buttered Potatoes	Brown Gravy
Hash Browned Potatoes (1/o)	Steamed Rice
Steamed Carrots	Mashed Potatoes
Steamed Brussel Sprouts	Mixed Vegetables
Carrot, Pineapple, and Raisin Salad	Steamed Green Beans
Devil's Food Cake/Vanilla Frosting	Apple w/Raisin Salad
White Cake/Chocolate Frosting	Devil's Food Cake/Vanilla Frosting
Pineapple Pie	White Cake/Chocolate Frosting
Oatmeal Cookies	Pineapple Pie
	Oatmeal Cookies

30 July 1986 (Day 2)

Lunch	Dinner
Hot Roast Beef Sandwich	Fried Chicken
Brown Gravy	Chicken Gravy
Deep Fried Fish Portion	BBQ Chicken
Tartar Sauce	Swiss Steak
Mashed Potatoes	Mashed Potatoes
Rissole Potatoes	Steamed Rice
Hash Browned Potatoes (1/o)	Green Beans
Steamed Carrots	Broccoli w/Cheese sauce
Corn	Steamed carrots (1/o)
Macaroni Salad	Macaroni Salad
Double Chocolate Chip Cookies	Double Chocolate Chip Cookies
Ginger Bread w/Lemon Sauce	Ginger Bread w/Lemon Sauce

31 July 1986 (Day 3)

Lunch	Dinner
Beef Stew w/Biscuits	Chili Con Carne w/Beans
Roast Pork Loin	Beef Kabobs
Swiss Steak (l/o)	Roast Pork (l/o)
Brown Gravy	Brown Gravy
Mashed Potatoes	Mashed Potatoes
Buttered Noodles	Steamed Rice
Steamed Rice (l/o)	Corn O'Brien
Wax Beans	Steamed Mixed Vegetables
Peas and Carrots	Three Bean Salad
Three Bean Salad	Chocolate Pie/Whipped Topping
Chocolate Pie/Whipped Topping	White cake/Lemon Sauce
White cake/Lemon Sauce	

1 August 1986 (Day 4)

Lunch	Dinner
New England Boiled Dinner	Baked Chicken
Veal Parmesan	Chicken Gravy
Brown Gravy	Batter Fried Cod
Mashed Potatoes	Tartar Sauce
Steamed Carrots	New England Boiled Dinner (l/o)
Steamed Cabbage	Mashed Potatoes
German Coleslaw	Rissole Potatoes
Chocolate Cookies	Broccoli/Cheese Sauce
Chocolate Cream Pie/Whipped Topping	Steamed Carrots (l/o)
White Cake/Chocolate Icing	Steamed Cabbage (l/o)
	German Coleslaw
Hot Dogs in addition to usual	Chilled Peach Slices
short order items	Chocolate Cookies
	Chocolate Cream Pie/Whipped Topping
	White Cake/Chocolate Icing

4 August 1986 (Day 5)

Lunch	Dinner
Turkey Nuggets	Grilled Liver w/Onions
Turkey Gravy	Brown Gravy
Baked Lasagna	Spaghetti w/Meatsauce/Parmesan Cheese
Rissole Potatoes	Turkey Nuggets (1/o)
Hash Browned Potatoes (1/o)	Mashed Potatoes
Buttered Mixed Vegetables	Toasted Garlic Bread
Brussels Sprouts	Stewed Tomatoes w/Green Beans
Carrott, Pineapple and Raisin Salad	Buttered Mixed Vegetables
White Cake/Chocolate Frosting	Carrot, P/A & Raisin Salad
Chocolate Brownies	White Cake/Chocolate Frosting
Cherry Pie	Cherry Pie
Apple Pie	Apple Pie
Blueberry Pie	Blueberry Pie

5 August 1986 (Day 6)

Lunch	Dinner
Beef Curry	Roast Pork Loin
Honey Glazed Cornish Hen	Brown Gravy
Chicken Gravy	Beef Curry (1/o)
Combination Pizza	Cornish Hens (1/o)
Mashed Potatoes	Deep Fried Shrimp
Steamed Rice	Rice (1/o)
Hash Browned Potatoes (1/o)	Mashed Potatoes
Whole Kernel Corn	Buttered Corn
Buttered Peas	Peas and Carrots
Macaroni Salad	Three Bean Salad
Three Bean Salad	Chilled Applesauce
Devil's Food Cake/Chocolate Frosting	Devil's Food Cake/Chocolate Frosting
Sugar Cookies	Sugar Cookies
White Cake/Chocolate Icing	White Cake/Chocolate Icing
Apple Pie	Apple Pie
Cherry Pie	Cherry Pie
Blueberry Pie	Blueberry Pie

6 August 1986 (Day 7)

Lunch	Dinner
Meatloaf	Beef Stroganoff
Baked Pork Chops/Apple Rings	Baked Tuna and Noodles
Brown Gravy	Pork Chops (1/o)
Mashed Potatoes	Steamed Rice
Parsley Buttered Potatoes	Peas and Carrots in White Sauce
Sweet Peas in White Sauce	Buttered Sucotash
Steamed Carrots	Cucumber and Onion Salad
Cucumber and Onion Salad	Chocolate Chip Cookies
Applesauce	Apple Pie
Apple Pie	Cherry Pie
Cherry Pie	Blueberry Pie
Blueberry Pie	

APPENDIX B

To accurately document nutrition initiatives implemented in the NCO Academy Dining Facility during the time of the Garrison Dining Facility Nutrition Research Study, the Ft. Riley Food Advisor was requested to provide this information. A copy of the response received in reply to this request is provided at this appendix.

DEPARTMENT OF THE ARMY
HEADQUARTERS 1ST INFANTRY DIVISION (MECH) AND FORT RILEY
FORT RILEY, KANSAS 66442-5000

AFZN-DL

8 September 1986

SUBJECT: Nutrition Initiatives

Commander
Military Nutrition Division
ATTN: SGRD-UE-N
Natick, MS 01760-5007

1. Per conversation between MAJ Carlson, USARIEM, and SGM Kelly, this Headquarters, the NCO Academy has instituted the following nutrition initiatives:

a. Serving fresh fruit at all meals.

b. Serving 2 percent milk at all meals.

c. Making available a nutritionally balanced 500 calorie menu for each meal served.

d. Providing herbal seasoning on each dining room table as an alternative to salt.

e. Placing calorie cards by each item served.

f. Deleting butter from cooked vegetables.

g. Serving margarine as an alternative to butter.

h. Using unsaturated fats for frying.

i. Reducing the salt by 25 percent in all recipes except pastry.

j. Serving unsweetened drinks at lunch and dinner meals.

k. Serving low calorie cottage cheese at lunch and dinner meals when available.

l. Serving an alternative to fried food at each meal.

m. Serving unpeeled French Fries.

n. Steaming fresh and frozen vegetables whenever possible.

o. Serving low calorie yogurt at each meal.

AFZN-DL
SUBJECT: Nutrition Initiatives

p. Having a sugar substitute available for each meal.

q. Conducting periodic classes for cooks on their role in the Army's nutrition awareness program.

r. Displaying nutrition awareness posters in the dining facility.

2. If we can be of further assistance, please feel free to contact this office, SGM Kelly at AUTOVON 856-3133.

FOR THE COMMANDER:

For WILBURN C. GRISWOLD
LTC, TC
Director of Logistics

Demographic Questionnaire

Name _____

SSN_____

Subject Number _____

Sex M F

Age _____

Race_____

1-White

2-Black

3-Hispanic

4-Other _____

Length of Time in Military _____years

Rank_____

MOS

Primary _____

Secondary _____

Duty_____

Marital Status

1-Single

2-Married

3-Separated

4-Divorced

5-Widow/Widower

Highest Level of Civilian Education Completed

1 Grade School 3 College, Undergraduate

2 High School 4 Graduate School 5 Other(Specify) _____

Do you smoke or chew tobacco? Yes No

Number of cigarettes smoked per day _____

Number of cigars smoked per day _____

Number of pipes smoked per day _____

Number of tobacco chews per day _____

How long have you been smoking/chewing?_____

NATICK Form 662 (ONE-TIME), 1 Jul 86

Demographic Questionnaire

During a typical week, which meals do you eat, regardless of where you eat them? (Please check meals you eat).

	M	T	W	TH	F	SAT	SUN
Breakfast							
Lunch							
Dinner							

During a typical week, which meals do you eat at a military dining facility? (Please check those eaten in a military dining facility).

	M	T	W	TH	F	SAT	SUN
Breakfast							
Lunch							
Dinner							

How often during the week do you eat snacks? _____Times

Between breakfast & lunch _____times

Between lunch & dinner _____times

After dinner _____times

Please indicate any dietary supplements you take regularly. Specify brand and amount.

Protein _____

Vitamins _____

Minerals _____

Other _____

Are you satisfied with your current weight? Yes No

Are you trying to lose weight? Yes No How Much?

Are you trying to gain weight? Yes No How Much?

Do you follow any special diet? Yes No

If yes, please specify type _____

Do you add salt to your food? Yes No

Do you use a herb shaker? Yes No

Appendix D

FOOD CONSUMPTION RECORD

Breakfast Meal

NAME: _____ Data Collector: _____

SUBJECT #: _____ Data Enterer: _____

DATE: _____

Food Type	Description	Code #	Portion Served	Portion Returned	Reason not Finished	Added Salt
Egg Entree	Fried Eggs					
	Hard Cooked					
	Asst Omelets					
	(Specify_____)					
Breakfast	Bkd Bacon Slices					
	Bkd Sausage Patties					
	Creamed Beef					
Starches	Hash Brown Potatoes					
	French Toast					
	Griddle Cakes					
	Grits					
	Dry Cereal					
	(Specify_____)					
	BP Biscuits					
	Toast					
	Pastry					
	(Specify_____)					
Fruit/Juice (Specify)	_____					
	_____					
Beverages	Whole Milk					
	2% Fat Milk					
	Chocolate Milk					
	Coffee					
	Tea					
Spreads and Condiments	Maple Syrup					
	Melted Butter					
	Butter					
	Margarine					
	Jam/Jelly					
	Creamer					
	Sugar					
	Salt					
	Pepper					
	Herb Shaker					
	Catsup					
	Hot Sauce					
Other	_____					
	_____					

NATICK Form 660 (ONE-TIME), 1Jul86

Appendix D

FOOD CONSUMPTION RECORD

Lunch/Dinner

NAME: _____ Date: _____

SUBJECT #: _____ Data Collector: _____

MEAL: ☐ Lunch ☐ Dinner Data Enterer: _____

Food Type	Description	Code #	Portion Served	Portion Returned	Reason not Finished	Added Salt
Entree						
Starch						
Vegetable						
Bread	Whole Wheat					
	White					
	Rye					
Sandwich						
Soup						
Salad	Chef's					
Salad						
Salad Dressing						
Dessert						

Food Type	Description	Code #	Portion Served	Portion Returned	Reason not Finished	Added Salt
Beverages	Whole Milk					
	2% Fat Milk					
	Skim Milk					
	Chocolate Milk					
	Coffee					
	Tea					
	Hot Chocolate					
	Koolaid					
	Diet Koolaid					
Soft Drinks						
Condiments	Butter					
	Margarine					
	Sugar					
	Sugar Substitute					
	Salt					
	Pepper					
	Herb Shaker					
	Hot Sauce					
	Creamer					
	Catsup					
	Mustard					
	Relish					
	Peanut Butter					
	Jelly					
Other						

Appendix E

WEATHER DATA

29 July 1986	Time	Wet Bulb Reading	Category
	0905	82.2	1
	1002	84.5	1
	1102	83.5	1
	1206	86.6	2
	1300	87.7	2
	1403	89.2	3
	1512	91.4	4
	1602	91.3	4
	1715	89.4	3
	1810	89.1	3
	1909	88.3	3
30 July 1986	0700	75	1
	0900	82.5	1
	1030	85.3	2
	1100	80.4	0
	1200	82.2	1
	1310	84.9	1
	1410	86.2	2
	1500	89.8	3
	1600	89.9	3
	1700	88.6	3
	1800	85.3	3

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